IN THE CLAIMS:

Please amend the claims as follows:

1-13 (Canceled)

14. (New) A method of reducing polarization induced signal fading in an optical interferometer network, comprising:

providing a first and a second optical path from an input port to an output port, wherein transmission delays of the first and second optical paths differ by an amount of time τ;

inputting an input signal into the input port;

altering a polarization state of the input signal to switch between a first state of polarization (SOP0A) during a first portion of a polarization switching period and a second state of polarization (SOP0B) during a second portion of the polarization switching period, wherein the polarization state is altered with a modulation frequency that is a multiple of $1/(4\tau)$;

receiving an interference signal from the output port, the interference signal caused by interference between a first output signal having passed through the first optical path and a second output signal having passed through the second optical path; and

processing the interference signal to determine a phase difference between the first and second output signals.

15. (New) The method of claim 14, further comprising extracting and processing four interference signals (i,ii,iii,iv) to produce estimates for interference phases of the four interference signals, wherein the four interference signals are separated in time and represent interference between polarization states at the output port that originate from the transmission of:

(i) SOP0A through both the first and the second optical path,

(ii) SOP0B through the first optical path and SOP0A through the second optical path,

(iii) SOP0B through both the first and the second optical paths, and

(iv) SOP0A through the first optical path and SOP0B through the second optical path.

16. (New) The method of claim 15, wherein the interference visibilities or fringe amplitudes of the four interference signals (i,ii,iii,iv) are calculated.

17. (New) The method of claim 16, wherein SOP0A and SOP0B are orthogonal polarization states, a first improved phase estimate (Φ_1) is calculated as the average of interference phase estimates produced from the interference signal (i) and the interference signal (iii), a second improved phase estimate (Φ_2) is calculated as the average of the two interference phase estimates produced from the interference signal (ii) and the interference signal (iv), and a combined phase estimate is calculated as a weighted average of Φ_1 and Φ_2, the ratio between the weighting of Φ_1 and the weighting of Φ_2 is decided from the relation between the interference visibilities or fringe amplitudes.

18. (New) The method of claim 14, wherein the optical interferometer network is a wavelength division multiplexed interferometer network having the first and second optical paths.

19. (New) The method of claim 14, wherein the optical interferometer network is a time division multiplexed interferometer network having the first and second optical paths.

20. (New) The method of claim 14, wherein the optical interferometer network is space division multiplexed interferometer networks having the first and second optical paths.

21. (New) An assembly for reducing polarization induced signal fading in an optical interferometer network, comprising:

a first and a second optical path from an input port to an output port, wherein transmission delays of the first and second optical paths differ by an amount of time τ;

an optical source for launching optical power into the input port, the optical source having a polarization modulator that switches a polarization state between a first state of polarization (SOP0A) during a first portion of a polarization switching period and a second state of polarization (SOP0B) during a second portion of the polarization switching period, wherein the polarization state is altered with a modulation frequency that is a multiple of $1/(4\tau)$;

a detector for converting the optical power received from the output port into electrical detector signals; and

a control and signal processing unit for processing the detector signals to determine a phase difference induced between optical waves having traveled the first and second paths.

22. (New) The assembly of claim 21, wherein the control and signal processing unit is configured to extract and further process four interference signals (i,ii,iii,iv) to produce estimates for at least one member of the group consisting of interference phases of the four interference signals, visibilities of the four interference signals and fringe amplitudes of the four interference signals, the four interference signals separated in time and represented by interference between polarization states at the output port originating from the transmission of:

(i) SOP0A through both the first and the second optical path,

(ii) SOP0B through the first optical path and SOP0A through the second optical path,

(iii) SOP0B through both the first and the second optical paths, and

(iv) SOP0A through the first optical path and SOP0B through the second optical path.

23. (New) The assembly of claim 22, wherein SOP0A and SOP0B are orthogonal polarization states, a first improved phase estimate (Φ_1) is calculated as the average of interference phase estimates produced from the interference signal (i) and the interference signal (iii), a second improved phase estimate (Φ_2) is calculated as the average of the two interference phase estimates produced from the interference signal (ii) and the interference signal (iv), and a combined phase estimate is calculated as a weighted average of Φ_1 and Φ_2, the ratio between the weighting of Φ_1 and the weighting of Φ_2 is decided from the relation between the interference visibilities or fringe amplitudes.

24. (New) The assembly of claim 21, wherein the first and second optical paths are within a fiber optic Michelson interferometer.

25. (New) The assembly of claim 21, the first and second optical paths are within a fiber optic Fabry-Perot interferometer.

26. (New) The assembly of claim 21, the first and second optical paths are within a fiber optic Mach-Zender interferometer.